

## Impact of COVID-19 on KPIs Development Focused on Inventory

### **Turnover Ratio in Automotive Sector**

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**Abstract:** Key Performance Indicators (KPIs) are the vital navigation instruments used by managers to understand whether their business is on a successful voyage or whether it is veering off the prosperous path. The right set of indicators will show the company performance and point out the areas which need attention. The impact of COVID-19 on today's globally integrated automotive sector is significant. The management has focused on main questions like how to accelerate cost-out measures and optimize the working capital across the entity. One of the items that have started to be in the center of attention nowadays is a company's inventory and its level and turnover time. Therefore concerning about this, the inventory management should be sensitive in terms of continuous production and cash flow. Important question for management is how to identify, prioritize and accelerate cost-out measures across the entity. Finding the way how to optimize of volume of inventory, working capital and identify the proper measures to deliver rapid, tangible cash-flow benefits should be consulted in each company on daily basis.

**Key words:** Key Performance Indicators (KPIs), inventory, inventory turnover ratio, value added indicator, cash conversion cycle, working capital

JEL codes: M21, I

#### **1. Introduction**

The outbreaks of the COVID-19 pandemic have had enormous impact on the economic activities in all countries. Supply chain sector was one of the business areas which were struggling a lot. The consequences of this persist until today. Lockdowns interrupted the demand and supply of many goods due to which the financial flows have been affected. It destabilized specially small and medium enterprises. Managers had to watch very carefully the production cycle to avoid any stop production. One the main their goal was to set up KPIs as useful measuring tool to uncover the weaknesses and start the action immediately. In the following paper we focus on the inventory cycle as an important part of KPIs measurements. The aim of the paper was to show how it is important to recognize each cycle of inventory turnover to eliminate the deviations. In the way to achieve the targets the company has to find the way how to use the sources more effectively. As a methodology we used data analysis and logarithmic method of calculation. As the target company for the analysis we chose the Slovak factory operating in automotive industry. Then we compared the figures from production database with targets for 2020.

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Real figures represent the material consumption, the volume of semi-finished goods, finished goods and total turnover of sale during the period from January to May 2020. Target figures are set up by management and controlling of the company usually ones a new and are valid for the next year.

#### 2. Material and Methods

Measuring of the company performance is related with fulfillment of one main task of management accounting. It means to provide the information about company performance focused on effective solutions and application of tools for managerial control (Král, 2018).

Well-known is saying which is used to highlight the critical importance of metrics: "What you get measured gets done" and "if you cannot measure it, you cannot manage it" (Marr, 2012). It is very important to set up the right KPIs instead to collect and report everything that is easy to measure. Marr classifies KPIs from these perspectives: financial, customer, marketing and sales, operational processes and supply chain, employee and corporate social responsibility (Marr, 2012). Another approach shows on the critical factors of success which determines well-being and vitality of the company in the business area where good results should be achieved. At the beginning the company would have around 30 areas for critical factors statement. Parameter declares that it is important to decrease their numbers to 5-8 (Parameter, 2008). Their identification easier leads to KPIs settings. KPIs parameters are the useful tools for detecting deviations in the economic situation of the company and play important role in crisis management. Top management usually uses the set of financial analysis indicators where the inventory turnover ratio plays important role (Gozora, 2017).

Inventory turnover ratio says about how many days last one turn of inventory. It indicates the required time for the transformation of the financial funds via production and sale of goods back to financial funds. The optimum is if the company shows decreasing values (Kotulič, 2010). Nevertheless KPIs setting should start with the company strategy in its field of business. Papula declares that for objective assessment of company's strengths and weaknesses it is required to set up the measure tools which can be comparable with the subjects operating in the same business area (Papula, 2018).

#### 3. Inventory Level Management

Inventory measurement is very important indicator that shows how well the company process depending on its inventory. It is a part of current assets in balance sheet. From the valuation point of view we can identify these categories of inventory:

- purchased inventory raw material, packaging material, other material expenses and
- Inventory of own production unfinished and finished goods.

The inventory is filled with the goods that are currently on demand in the market and to run out of stock is undesirable. Also if the automotive sector can meet the future demand based on forecast the proper inventory management is achievable. Purchased inventory is evaluated by purchased prices plus acquisition cost. Inventory from own production is evaluated by own production cost and it is regulated by §44 of Law published by Ministry of Finance of the Slovak Republic from 16 December 2002 No. 23054/2002-92 where are defined the accounting procedures and frameworks.

#### 3.1 Inventory Turnover Ratio — Calculation and Comparison

It is essential to have enough material, semi finished goods and finish goods for continuous production process. Just-in-time inventory management is more or less rarely possible. To secure the availability, the inventory factor has to be stored which requires additional cost. Therefore to measure the inventory turnover ratio is essential. The goal of each company is to shorten this ratio as much as it could not affect the production. Following analysis should show us how to accelerate the time of inventory turnover. Inventory turnover ratio formula.

$$ITR = \frac{INV x d}{T}$$
(1)

ITR: inventory turnover ratio (ITR0 - planned, ITR1 - real),

INV: inventory summary,

T: Turnover,

d: Certain period of the year in days (month – 30 days, quarter – 90 days, year – 365 days).

Inventory turnover ratio represents the relationship between the inventory category and certain turnover depends on turnover type. We can categorize the turnover indicators into following groups.

Global inventory turnover indicators	Particular inventory turnover indicators (turnover is related to particular inventory category)		
Mostly use the total turnover of realized goods for each type of inventorys	1. Material stock — material consumption		
	2. Semi finished goods stock — cost of semi finished goods		
	3. Finished goods — cost of finished goods		
	4. Total stock from production — total turnover		

Table 1 Categorization of Inventory Turnover Indicators

Source: ZALAI, 2016

Global turnover indicators indicate how the change of total inventory turnover is influenced by turnover of each inventory category. Particular turnover indicators allow us to analyze turnover for each inventory category separately and gives us better view for further analysis. Following pyramid shows us that by connecting the particular inventory indicators into one analytical model we can analyze inventory turnover ratio expressed by global inventory turnover:



Figure 1 Multiplicative Model of Inventory Turnover Analysis

Source: ZALAI, 2016

MAT: material in inventory, SFG: semi-finished goods, FG: finished goods, d: certain period in days (month – 30 days, quarter – 90 days, year – 365 days), T: total turnover of realized goods, MC: material consumption (raw material, packaging material), CSFG: cost of semi-finished goods, CFG: cost of finished goods (production performance).

From the analytical model is clear that inventory turnover depends on:

- particular indicators of each inventory category and
- speed of going through from one to another inventory category (the speed of change of material inventory to unfinished goods, from unfinished goods to finished goods and finished goods to sale).

In the following analysis there is an example where the actual data of turnover time of whole inventory is compared with planned turnover time. It is in relation with average status of each inventory type and the speed of their change from one category to another within production cycle. There are used multiplicative links between the indicators which are mentioned in formula 2 above.

Indicator	2020	2020	2020	2020	2020	2020
	Target	Jan	Feb	March	April	May
MAT	1 356 000	1 486 000	1 437 000	1 421 000	1 313 000	861 000
MC	706 000	567 000	699 000	583 000	369 000	167 000
SFG	1 108 000	1 528 000	1 456 000	1 717 000	1 378 000	1 213 000
CSFG	904 000	903 000	1 066 000	1 110 000	1 041 000	930 000
FG	610 000	668 000	708 000	702 000	960 000	799 000
CFG	1 230 000	1 337 000	1 424 000	1 373 000	838 000	383 000
Inventory	3 074 000	3 682 000	3 600 000	3 839 000	3 651 000	2 873 000
ITR	35.84	51.50	46.65	50.40	63.10	71.88

 Table 2
 Actual Figures of Inventory and Turnover Development of Production Company in Automotive Industry

Source: ZALAI, 2016 and own research





Figure 2 KPI Development

From the chart is clear that the production performance from January to March 2020 was on desirable way to achieve the turnover target. But from April to May there was recorded significant drop in sale due to lower customer demand caused by situation on the market with COVID-19. The company in an effort not to stop the production and keep human resources at the same level as was planned, produced the parts for inventory. It can be seen in higher level of finished goods. Inventory turnover ratio significantly increased during the period from January to May 2020 due to high level of material, semi-finished and finished goods.

In following 3 tables we analyzed the variations between actual inventory turnovers as for May 2020 and compared them with planned data taken from operational plan. Data are taken from the real production company.

# 3.2 The Analysis of Impact on the First Level of Pyramid (Formula 2) — Level of Global Indicator and Inventory Turnover Time

Total turnover is the summary of global indicators change of each inventory category (calculation in Tables 3-5):

- impact of global indicator on MAT turnover: 5.73 days,
- impact of global indicator on SFG turnover: 17.43 days,
- impact of global indicator on FG turnover: 12.88 days.

In the analyzed period the inventory turnover time increased by average 36 days. Each category caused an extension in days; mostly the slowdown is seen in the transfer from semi-finished goods into finished goods.

#### 3.3 The Analysis of the Impact of Each Inventory Categories on Global Indicators

In the analysis is used logarithmic method for calculation of inventory category on respective global indicator of this category and on global indicator of total inventory turnover. Data are compared together planned with actual as for May 2020.

	Plan	May 2020	Change	
MAT.d/T	15.81 days	21.54 days	+ 5.73 days	
MAT.d/MC	57.62 days	154.67 days	+ 97.05 days	
MC/CSFG	0.78	0.18	-0.60	
CSFG/CFG	0.74	2.43	+1.69	
CFG/T	0.48	0.32	-0.16	

Table 3 The Analysis of the Influence of Particular Indicators on Material Turnover

Source: ZALAI (2016) and own research

In the table as for May 2020, it is shown the increase of material turnover time by 5.73 days. The reason for that was in slow down the material consumption by 97.05 days as the result of decreased demand. It negatively affected the transfer from semi finished goods to finished goods. Positive is transfer from material to semi-finished goods and realization of finished goods.

Table 4 The Analysis of the Influence of Particular Indicators on Semi Finished Goods Turnover

	Plan	May 2020	Change
SFG.d/T	12.92 days	30.35 days	+17.43 days
SFG.d/CSFG	36.77 days	39.13 days	+2.36 days
CSFG/CFG	0.74	2.43	+1.69
CFG/T	0.48	0.32	-0.16

Source: ZALAI (2016) and own research

In the case of detailed analysis of semi-finished goods inventory it can be seen again that the turnover period extended especially in relation with cost of material consumption. The transfer from semi-finished goods to finished goods slowed down a bit.

	Plan	May 2020	Change	
FG.d/T	7,11 days	19,99 days	+12,88 days	
FG.d/CFG	14,87 days	62,58 days	+49,71 days	
CFG/T	0,48	0,32	-0,16	

 Table 5
 The Analysis of the Influence of Particular Indicators on Finished Goods Turnover

Source: ZALAI (2016) and own research

The turnover of finished goods inventory increased for global indicator by 13 days as well as for particular indicator - cost of finished goods by 50 days. Transfer from semi finished goods to finished goods took longer as it was desired. It shows the problems with requirements on the market like missing some components which caused stop production in some final customers plants (Mercedes, Land Rover or Stellantis group). Some volume of semi finish goods were produce on stock due to not stop production.

The change of inventory turnover ratio has impact on company economy. Turnover acceleration allows fulfill the production goals with lower need of the funds. On the other hand slowdown the turnover binds the fund in material, unfinished and finished goods. Therefore it is handy to complete the analysis by calculation either of fund amount saving or fund overrun. In the following formula there is compared actual inventory turnover time with planned and the difference is multiplied by average amount of daily turnover.

$$R = (ITR1 - ITR0) \cdot \frac{turnover May 2020}{d=365}$$
(3)  

$$R = (71,88 - 35,84) \cdot 1199000/365 = +118 \text{ T EUR}$$

R: saving/overrun the funds

Longer inventory turnover time in May 2020 compared to plan for 2020 by 36 days caused the overrun the funds by 118 T EUR.

This analysis shows that the saving of funds was especially during the process of transfer of material into semi-finished goods. It is the signal of smooth cooperation between stock of material and production requirements. Another saving of funds is seen from realization of finished goods into sale. It means that produced goods were immediately sold.

Finally we can tell that for acceleration of turnover time is the most important to shorten the production cycle on each level. It is essential to realize that technological and economical discipline should be always under the control in the company. Then the volume of inventory on each phase would be desirable, corresponding to the plan. It is very common that due to mistakes in planning the companies have to face with high level of useless inventory.

Impact of inventory management decision is significant in other important measurements like value added, cash conversion cycle or working capital.

#### 4. Value Added

To increase the volume of value added is ensured by the growth in volume of economical process output on

the one side while at the same time minimize inputs (Chajdiak, 2010). KPIs for value added show how efficient the good parts are produced. It is the result from own production realization and represent the key indicator for whole organization.





The chart shows us the unpleasant development of production in automotive industry due to COVID-19 impact. There is seen a significant decrease of production performance due to lack of demand and high level of unused total material stock.

#### 5. Cash Conversion Cycle

The main reasons why the companies get into difficulties are not just lack of sales but the company is running out of money (cash) to pay their day-to-day cost of business. A numbers of KPIs have been developed to access a company's cash position, generally known as cash flow. The cash conversion cycle (CCC) is this metric and inventory is a part of it. The CCC metric presents the length of time, usually in days, that it takes for an organization to convert resource input into cash flow. The metric calculation is composed from three steps:

- 1) the length of time needed to sell inventory (DIO),
- 2) the length of time needed to collect receivables (DSO),
- 3) the length of time the company is afforded to pay its bills without penalties (DPO) (Marr, 2012).
- 4) Generally said the lower the CCC numbers in days the better for the company's liquidity.

$$CCC = DIO + DSO + DPO$$
(5)

DIO gives a measure of the number of days it takes for the company's inventory to turn over, or to be converted to sales, either as cash or as account receivable.

DSO gives a measure of the number of days it takes a company to collect on sales that go into accounts receivables.

DPO gives a measure of how long it takes the company to pay its obligations to suppliers.

CCC KPI should be used as the starting point for performance improvement interventions such as reducing inventory levels by introducing techniques like lean or just-in-time production or techniques to smooth the account receivables process.

#### 6. Working Capital

If the organization wants to build a healthy business, needs to measure the cash availability on day-to-day operational activities. For this purpose the working capital ratio is another key cash-flow measure also referred to current position. It measures how much in liquid assets a company has available to build and maintain its business. Generally said the companies with positive working capital ratio will be more successful since they can expand and improve their operations. Current assets represent cash, marketable securities, account receivables and current inventories. Current liabilities include account payables, accrued expenses, current reserves, short-term debt and part of long-term debt that is classified as current (Marr, 2012).

Working capital = Current assets – Current liabilities (6)

Working capital is often used as barometer to measure an organization's overall health and liquidity. Being in a negative working capital position often makes an organization unattractive to potential investors.

#### 7. Discussion and Conclusion

Having a clear picture about the inventory management is helpful at any moment in business. However, during the COVID-19 outbreak, knowing what we have in stock is more important than ever. The companies must closely monitor short-term and long-term demand. For the situations, where stock demand changes dramatically, like the consequences of the pandemic, an effective inventory management system can be extremely beneficial. It can for example reduce manpower needed for managing extra stock requirements. On the other side the company is at the risk of supply chain disruption due to shortage of raw material and component parts. That is why the inventory safety stock parameters need to be updated to reflect the supply-side volatility. Also at the same time; from the cash flow perspective, the entity should consider the actions to reduce semi finished and finished goods inventory. Balancing the demands for more buffer inventory and managing cash flow may not be easy. To keep continuous savings requires fundamental improvements in supply chain visibility, planning and setting the inventory and safety stock policies, production planning and lead-time updating.

There are many KPIs that look at stock management efficiency. However the most important inventory KPIs are those that show how well the company can optimize the stock level. KPIs should meet demand while managing stock levels to prevent over or under stocking.

We might think that KPIs should not primarily be about measurement. We have to remember that behind every number are real people, such as customers who have purchased goods or services or employees who are satisfied or not. It is very important always look behind of the KPIs values to get a real sense of their meaning.

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